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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/585,980	06/02/2000	Lizhi Wang	80398.P322	5683

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EXAMINER

HESELTIME, RYAN J

ART UNIT PAPER NUMBER

2623

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Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/585,980

Applicant(s)

WANG, LIZHI

Examiner

Ryan J Hesseltine

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1)  Responsive to communication(s) filed on 28 July 2003.
- 2a)  This action is FINAL.                      2b)  This action is non-final.
- 3)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4)  Claim(s) 1-45 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5)  Claim(s) \_\_\_\_\_ is/are allowed.
- 6)  Claim(s) 1-45 is/are rejected.
- 7)  Claim(s) \_\_\_\_\_ is/are objected to.
- 8)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9)  The specification is objected to by the Examiner.
- 10)  The drawing(s) filed on \_\_\_\_\_ is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11)  The proposed drawing correction filed on 11 June 2003 is: a)  approved b)  disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12)  The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a)  All   b)  Some \*   c)  None of:  
1.  Certified copies of the priority documents have been received.  
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14)  Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a)  The translation of the foreign language provisional application has been received.
- 15)  Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1)  Notice of References Cited (PTO-892)                      4)  Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2)  Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5)  Notice of Informal Patent Application (PTO-152)
- 3)  Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_                      6)  Other: \_\_\_\_\_

## DETAILED ACTION

### *Drawings*

1. The drawings were received on July 11, 2003. These drawings are not acceptable. It is believed that applicant intended to add an arrow (line) pointing from the numeral 712 to the ellipse fitted to the candidate patch 710, rather than deleting the numeral (see page 11, line 25-27). The replacement Figures 3, 4, and 5 have been approved.

### *Response to Arguments*

2. Applicant's amendment to the specification and petition, filed July 15, 2003, with respect to the color drawings have been fully considered and are persuasive. The objection of the drawings has been withdrawn.

3. Applicant's arguments, see pages 10-13, filed July 28, 2003, with respect to the rejection(s) of claim(s) 1, 4, 5, 8, 12, 15, 16, 19, and 23 under 35 USC 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Cosatto et al. (USPN 5,864,630, cited on applicant's IDS). The examiner would like to point out that Kinjo is still relied upon for a portion of the claimed subject matter. On page 11, last paragraph, applicant states "the Applicant respectfully disagrees with the interpretation that the 'changing differential values' analysis (see column 18-19 lines 65-17) equates to 'determining a first area wherein a color gradient has a low value' as claimed in claim 1." Merriam-Webster's Collegiate Dictionary (10<sup>th</sup> Edition) defines the word gradient as "1 a: the rate of regular or graded ascent or descent: INCLINATION...2: change in the value of a quantity (as temperature, pressure, or concentration) with change in a given variable and esp. per unit distance in a specified direction,

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3: the vector sum of the partial derivatives with respect to the three coordinate variables x, y, and z of a scalar quantity whose value varies from point to point..." Although Kinjo does not explicitly use the word "gradient," the examiner believes this is exactly what is being done when "density values of the respective pixels in the regions are differentiated along a plurality of mutually different directions... a determination is made as to whether or not there is a region in which differential values in at least one of the plurality of directions changes regularly [high gradient value]... YES is given as the answer in the case of the region whose density changes with a predetermined pattern or the region whose density shows a repetition of a predetermined pattern of change. Since it can be determined that such a region has *a low probability of being a region corresponding to a human figure*... the region in which differential values change regularly is excluded in Step 162 from the subject of determination of the region representing the contour of the head of a human figure" (emphasis added; column 18, line 65-column 19, line 17). The examiner believes that the latter step of excluding the region where differential values change regularly is equivalent to "determining a first area wherein a color gradient has a low value" as stated in claim 1. The examiner would also like to point out that Kinjo does not limit the search of a shape pattern representing the internal structure of the face to a pair of eyes, but may also include using a nose, mouth, pair of eyebrows, or the like or combination thereof (column 39, line 45-51).

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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5. Claim 34 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 34 recites the limitation "said at least one candidate patch" in line 8-9. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-5, 8, 12-16, 19, 23-27, 30, 34-38, 41, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kinjo (USPN 5,629,752, cited on applicant's IDS) in view of Cosatto et al. (USPN 5,864,630, cited on applicant's IDS), hereafter Cosatto.

8. Regarding claims 1, 23, and 45, Kinjo discloses an apparatus and method of determining at least one candidate patch for human faces in a color graphic image (column 19, line 18-25), comprising: determining a first area wherein a color gradient (changing differential values) has a low value (exclude the regions in which differential values change regularly; column 18, line 65 to column 19, line 17); determining a second area (white region) wherein an intensity value has a high value (corresponding to a low pixel density value; column 17, line 33-42).

9. Kinjo does not disclose performing a logical AND on said first area and said second areas to create a third area, or selecting portions of the third area with suitable hue saturation to form said at least one candidate patch. Cosatto discloses a multi-modal method for locating objects in images using information obtained from several channels to evaluate the quality of

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individual features, as well as combinations of features including shape, color, and motion (column 5, line 47-54). It is also disclosed that the data produced by each channel comprises a list of areas which may contain head outlines and facial features (column 5, line 66-column 6, line 2), which are compared, evaluated, and integrated by a classifier which assigns a measure of confidence for each feature and each combination of features to determine which channel or combination should be used to arrive at the final result (column 6, line 20-34). Cosatto does not explicitly disclose that a logical AND is performed on a first area and a second area to create a third area, it is disclosed that areas from each feature channel are compared, evaluated, and integrated such that areas with the desired features are found having the combined features (column 6, line 58-66). Cosatto further discloses that an area with suitable hue saturation (skin color) is selected to form at least one candidate patch (column 13, line 14-29). It would have been obvious to one of ordinary skill in the art at the time the invention was made to locate objects in images using areas found using combined results ("logical AND") from several feature channels and selecting areas with suitable hue saturation to form at least one candidate patch as taught by Cosatto in order to enable a tracking system to extract enhanced detail from the collected images thereby improving the accuracy and robustness of the tracked output over that of simple color segmentation as well as providing information to the tracking system which may be used to train the system for subsequent tracking (column 2, line 8-28).

10. Regarding claim 12, Kinjo discloses a system configured to determine at least one location of a human face in a color graphic image (column 19, line 18-25), comprising: a color gradient map configured to indicate true where a color gradient (changing differential values) has a low value (exclude the regions in which differential values change regularly; column 18, line

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65 to column 19, line 17); an intensity map configured to indicate true (white region) where an intensity value has a high value (corresponding to a low pixel density value; column 17, line 33-42). Cosatto (see above discussion of claims 1, 23, and 45) discloses a combined map configured to indicate true where information obtained from several channels are combined to find features including shape, color, and motion (column 6, line 20-34), and at least one candidate patch is selected from said combined map, wherein said candidate patches have suitable hue saturation (skin color; column 13, line 14-29).

11. Regarding claim 34, Kinjo discloses an apparatus comprising: a processor (facial-region extracting unit 40) coupled to a memory (ROM) through a bus; and a detection process (program) executed by the processor from the memory (column 16, line 37-48) to cause the processor to determine a first area wherein a color gradient (changing differential values) has a low value (exclude the regions in which differential values change regularly; column 18, line 65 to column 19, line 17); determine a second area (white region) wherein an intensity value has a high value (corresponding to a low pixel density value; column 17, line 33-42). Cosatto (see above discussion of claims 1, 23, and 45) discloses that information obtained from several channels are combined (“logical AND”) to find feature areas including shape, color, and motion (column 6, line 20-34), and selecting portions of the combined feature areas with suitable hue saturation (skin color) to form said at least one candidate patch (column 13, line 14-29).

12. Regarding claims 2, 13, 24, and 35, Kinjo discloses that determining said first area uses a first threshold value comparison (column 39, line 36-44).

13. Regarding claims 4, 15, 26, and 37, Kinjo discloses that determining said second area (density) uses a second threshold value comparison (column 17, line 33-42).

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14. Regarding claims 3, 5, 14, 16, 25, 27, 36, and 38, Kinjo does not explicitly disclose that said first or said second threshold is determined by normalization. The examiner takes Official Notice that determining thresholds by normalization is well known in the art. It would have been obvious to one of ordinary skill in the art at the time the invention was made to determine the predetermined threshold for binarization and differential density values normalization using the average density calculated for the overall image as taught by Kinjo (column 17, line 4-9).

15. Regarding claims 8, 19, 30, and 41, Kinjo discloses fitting an ellipse (elliptical region) to one of said at least one candidate patch (column 21, line 21-28).

16. Claims 6, 7, 9-11, 17, 18, 20-22, 28, 29, 31-33, 39, 40, and 42-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kinjo in view of Cosatto as applied to claims 1, 8, 12, 19, 23, 30, 34, and 41 above, and further in view of Lobo et al. (USPN 5,781,650, cited on applicant's IDS), hereafter Lobo.

17. Regarding claims 6 and 17, neither Kinjo nor Wang disclose that said third area is eroded or that said combined map includes an eroded boundary. Lobo discloses a system for automatic feature detection and age classification of human faces in digital images including a face template that is used for oval-fitting by the use of a potential image of an edge where a morphological operator first broadens the image's similar intensity regions, then narrows (erodes) the similar intensity regions in a copy of the image, and finally the narrowed image is subtracted from the broadened image (column 4, line 44-57). It would have been obvious to one of ordinary skill in the art at the time the invention was made to erode similar intensity regions as taught by Lobo in order to remove stray pixels and to isolate edges for detection.



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18. Regarding claims 7 and 18, Lobo discloses that said eroding (narrowing) is morphological (column 4, line 49-63).

19. Regarding claims 9 and 20, neither Kinjo nor Wang explicitly disclose determining if said ellipse is a bad fit to said at least one candidate patch or that said ellipse includes a degree of fit measure. Lobo discloses an oval fitting operation including iteratively updating the oval center position and the oval axes half-lengths until the total energy stabilizes around a minimum value and a final fit has been reached (column 5, line 39-48). It would have been obvious to one of ordinary skill in the art at the time the invention was made to determine the degree of fit of an ellipse about a candidate patch as taught by Lobo in order to ensure that the ellipse/oval is properly positioned and scaled to include the optimum amount of information for personnel identification or the like.

20. Regarding claims 10 and 21, Lobo discloses further processing said at least one candidate patch when said ellipse is a bad fit (iteratively update until total energy stabilizes; column 5, line 39-48).

21. Regarding claims 11 and 22, Kinjo discloses determining if said one of said at least one candidate patch is too smooth (column 18, line 54-63).

### *Conclusion*

22. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- USPN 5,583,659 to Lee et al. discloses a multi-windowing technique for thresholding an image using local image properties including gradient and intensity.

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- USPN 5,604,823 to Ono et al. discloses a method for extracting object images and method for detecting movements thereof including generating a potential field of gradients where the center point of a view window is stable at a flat part of the field.
- USPN 5,751,286 to Barber et al. discloses an image query system and method wherein images are searched using visual characteristics such as color, texture, shape, size, etc. which may be arithmetically or logically combined.
- USPN 5,774,177 to Lane discloses a textile fabric inspection system using a mask to generate a gradient image, which is then thresholded, dilated, eroded, and subjected to a blob analysis.
- USPN 5,867,609 to Shamoan et al. discloses a method for computing correlation operations on partially occluded data using at least two discriminants such as intensity and texture in conjunction to locate regions in the image.
- USPN 6,075,557 to Holliman et al. discloses an image tracking system and method wherein both hue and saturation change smoothly over a large portion of a human face under uniform illumination.
- USPN 6,263,113 to Abdel-Mottaleb et al. discloses a method for detecting a face in a digital image wherein skin color components having similar features are grouped together and further examined.
- USPN 6,445,835 to Qian discloses a method for image characterization using color and texture statistics with embedded spatial information.

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- USPN 6,272,249 to Kobayashi et al. discloses an image processing device capable of discriminating the classification of a particular area using a complexity calculating circuit and a difference comparator.
- Birchfield discloses "Elliptical head tracking using intensity gradients and color histograms."
- Singh et al. discloses "Monitoring driver fatigue using facial analysis techniques" including skin color information and gradient maps.
- Zhang et al. discloses "Locating facial features with color information" including a gradient decomposed Hough transform.
- Birchfield discloses "An elliptical head tracker" including determining the position and size of the best ellipse by maximizing the normalized sum of the image gradient magnitude around the perimeter of the ellipse.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan J Hesseltine whose telephone number is 703-306-4069. The examiner can normally be reached on Monday - Friday, 8:30 AM - 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on 703-308-6604. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-0377.

rjh  
October 10, 2003

  
JINGGEWU  
PRIMARY EXAMINER